The RUCS Vehicle

Technical Demonstration Summary Sheet

REMOTE UNDERWATER CHARACTERIZATION SYSTEM (RUCS)

THE NEED

Characterization and inspection of water cooled and moderated nuclear reactors and fuel storage pools of necessity requires characterization and inspection equipment capable of operating underwater. This equipment is often required to operate at depths exceeding 20 feet and in relatively confined spaces. The use of baseline technologies consists of radiation detectors and underwater cameras mounted on long poles, or stationary cameras with pan and tilt features mounted along the sides of the underwater facility. The need is for a more mobile method of performing close-up inspection and radiation measurements in confined spaces underwater.

THE TECHNOLOGY

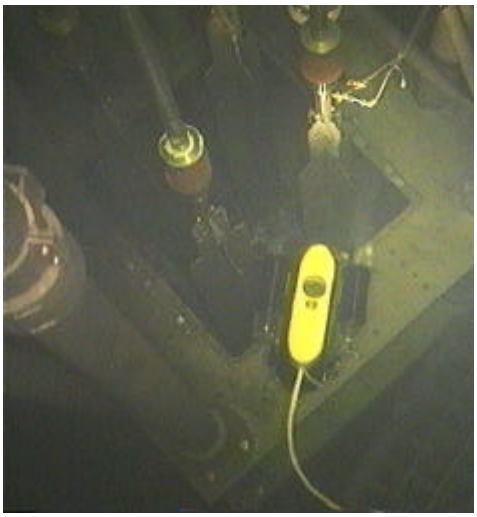
The remote underwater characterization system (RUCS) is a small, remotely operated submersible vehicle system intended to serve multiple purposes in underwater D&D operations. It is based on the commercially-available "Scallop" vehicle produced by Inuktun Services Ltd., British Columbia Canada, but has been modified by DOE'S Robotics Technology Development Program to be more suitable for activities associated with underwater D&D of nuclear facilities. The RUCS is designed to provide visual and gamma radiation characterization, even in confined or limited access areas. It utilizes a forward-looking tilt color camera and a GM tube radiation detector to get "on-the-spot" information needed to perform D&D intelligently and safely

THE DEMONSTRATION

The remote underwater D&D system was demonstrated in August 1998 at Idaho National Engineering and Environmental Laboratory (INEEL) as part of the INEEL Large Scale Demonstration and Deployment Project funded by DOE's Federal Energy Technology Center (FETC) for the D&D Focus Area. The demonstration took place in a canal containing two defueled test reactors at the INEEL TRA-660 facility. The RUCS was used to visually survey the canal and its contents, and also to gather radiological characterization data on the reactors and equipment on the floor of the canal.

THE RESULTS

The RUCS was simpler to deploy than the baseline approach of mounting an underwater camera or underwater radiation detector to a cable or a long (15' – 20') reach rod. It also reduced the number of personnel that had to be suited up in the canal area, which saves labor and reduces the potential for personnel exposure and contamination. Its small size and maneuverability allowed to it operate beneath overhead structures and behind the reactors, and it measured radiation levels 50% higher than previously known because of its ability to "fly" right up to objects. It should noted that it is not superior in all instances; the baseline approach provided slightly higher quality video, and the baseline radiation detector could access some areas such as the inside of pipes and get radiation data that the RUCS could not.



The RUCS vehicle inspecting a control rod on the ARMF reactor

CONTACTS

- Chelsea Hubbard, Project Manager, U.S. Department of Energy, Idaho Operations Office, (208) 526-0645
- Steve Bossart, DOE-FETC, (304) 285-4643
- Dick Meservey, Project Manager, Lockheed Martian Idaho Technologies Company, (208) 526-1834
- Dave Willis, Test Engineer, Idaho National Engineering and Environmental Laboratory, (208) 526-8613
- Terry Knight, President, Inuktun Services Ltd., British Columbia, Canada, (360) 650-0460